An Integrated Approach to Weed Control in Alfalfa Production Systems

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Introduction

The importance of weed control in forage production should not be overlooked, especially when you consider the high investment associated with alfalfa and other legume forages. Weeds reduce forage yield by competing for water, sunlight, and nutrients. For example, yield obtained from the first cutting of alfalfa can be significantly reduced by a heavy infestation of common chickweed. In addition to yield losses, weeds can also lower forage quality, increase the incidence of disease and insect problems, cause premature stand loss, and create harvesting problems. Some weeds are unpalatable to livestock or, in some cases, may be poisonous.

Weed management strategies in forage legumes should focus first on cultural practices and then on chemical weed control options. Vigorous, dense-growing forage legume stands have fewer weed problems. Thus, cultural and management practices that promote a highly competitive forage stand prevent many weed problems. These practices include: 1) liming and fertilizing fields based on soil test recommendations; 2) seeding well-adapted, vigorous, long-lived varieties; 3) buying weed-free seed; 4) cutting forage at proper timing intervals or growth stage; 5) timely control of insect and disease problems; and 6) rotating fields with other crops to interrupt the buildup of certain weeds.

Because of the aggressive nature of some weed species, they can become established despite preventive efforts. Therefore, herbicide treatment might be necessary to combat some weed problems. The specific herbicides and control strategies available for use will depend on the type of forage you grow (alfalfa, alfalfa/grass mixture, clovers, or other legumes), whether your stand is a new seeding [prior to first cutting] or an established stand, and the crop growth stage (dormant, nondormant, between cutting). Tables 1 and Table 2 can be used as a guide to the timing of herbicide applications and the relative response of weeds to these herbicides. Additional information can be found in UK Extension publication “Weed Control in Alfalfa and Other Forage Legume Crops” (AGR-148).

New Seedings

Weed control is more critical during the first year than any other period of alfalfa production. Forage seedlings grow slowly and are easily overcome by rapidly growing weeds. Research has shown that some broadleaf weed seedlings are capable of

growing five times more rapidly than certain legume seedlings. Because alfalfa stands gradually decline with age, it is important to start with a good stand. A uniform, dense stand is more likely to survive longer and have fewer weed problems than a thin stand.

Site Selection

Consider field history when selecting a field for legume forage production. It might be difficult to establish and maintain a weed-free forage stand in fields known to be infested with weeds such as musk thistle, curly dock, or yellow nutsedge. In addition, some herbicides that are applied in previously grown crops have the potential to carry over and cause injury to newly seeded forages. Alfalfa and other forage crops are sensitive to low concentrations of herbicides that contain atrazine (eg. AAtrex, Bicep II Magnum, Degree Xtra, Harness Xtra, etc.), clomazone (eg. Command), chlorimuron ethyl (eg. Canopy, Classic), and prosulfuron (eg. Spirit). More information on herbicides that have a potential to injure alfalfa and other forages can be obtained from your county Extension office and from the labels of herbicide products used in a previous crop.

Time of Seeding

Weed control is one of many factors that will determine whether you seed your fields in the spring or fall. As a general rule, the summer complex of weeds tend to overcome spring seedings, whereas, the winter weed complex tends to out-compete forages seeded in the fall. Therefore, for optimum establishment of most forage crops, you should consider fall seedings in fields that have a history with such weeds as large crabgrass, foxtails, or lambsquarters. Consider spring seedings in fields that are potentially infested with common chickweed, henbit, and yellow rocket.

Weed-Free Seed

Using weed-free seed is the first step to prevent the introduction of weeds. You should check the seed tag to determine the purity of the seed. In the case of alfalfa, the maximum total of weed seed contamination permitted by Kentucky seed regulations is 2 percent of weed seed by weight. Such species as johnsongrass and Canada thistle are considered noxious weeds and are prohibited as contaminants in seed lots sold for sowing alfalfa fields. Annual bluegrass, buckhorn plantain, dodder, giant foxtail, quackgrass, red sorrel, and wild garlic are examples of noxious weeds that must be listed on the label if they are present and, depending on the species, must not exceed a certain limit.

Liming and Fertilization

Adjusting soil pH and nutrient levels according to soil test recommendations is important during the establishment phase and throughout the life of the forage stand. The objective is to achieve a competitive alfalfa stand that is capable of suppressing weed emergence and growth. Proper liming and fertility are not effective for eliminating weeds that have already become established, especially in areas where the forage stand is poor. Likewise, some weeds, such as chickweed, curly dock, and crabgrass, respond favorably to fertilization. Thus, other weed control methods are often needed in addition to proper fertility.

Clipping New Seedings

Clipping or mowing can be an effective option for controlling some weeds, such as common cocklebur or jimsonweed, in legume forage stands. This method controls weeds by removing the leaves and lateral buds that develop new growth. Annual broadleaf weeds have buds that develop above the soil surface; they are more easily controlled with clipping or mowing than grasses, which have crown buds near the soil surface. Mow as low as possible to be effective. Because alfalfa plants and other legumes have crown buds, they can tolerate low clipping. When you clip or mow new seedings, be careful not to smother young forage legume plants with heavy residues. Remove clipped vegetation when weed infestations are heavy.

Herbicides for New Seedings

Herbicides used for new seedings are designed to eliminate or reduce competition from rapidly growing weeds during the establishment phase. In some instances, herbicides that aid alfalfa establishment have also contributed to higher yields in subsequent years and improved longevity of stands. During seedling development, forage grasses usually are highly susceptible to injury from herbicides used in legume establishment. Subsequently, no herbicides are registered for new seedings of legume grass mixtures.

Roundup Ready Alfalfa

Alfalfa varieties are now available for planting which are resistant to foliar applications of glyphosate (eg. Roundup, etc.). These Roundup Ready alfalfa varieties can allow opportunities to produce high quality, relatively weed-free forage with excellent crop safety and minimal harvest restrictions. Roundup Ready alfalfa varieties also provide an additional management tool during the first year of establishment, which is a critical time for weed control in alfalfa. During stand establishment, an initial glyphosate application is necessary at the 3 to 5 trifoliate leaf stage to remove the small percentage of glyphosate-susceptible alfalfa plants that can be present in a new seeding. In forage production systems, such as alfalfa-grass mixtures, planting a Roundup Ready alfalfa may not be a viable option. However, glyphosate could be used during the initial establishment phase of alfalfa followed by interseeding a desirable forage grass at a later time. In this case, all glyphosate applications must be applied before any forage grass is seeded and cannot be used after forage grasses emerge and become established within the alfalfa stand.

Maintaining Established Stands

Established forage legumes are capable of growing fairly rapidly and competing against many weed seedlings during the growing season. However, weeds gradually invade fields where forage stands decline with age. Timely mowing and the use of herbicides may aid in weed control and prolong the life of the stand. If you have a weed problem that occurs in field borders, along fence rows, or in adjacent fields, you should

mow or spray to prevent production and spread of weed seed from these areas into alfalfa and other hay fields. This is particularly important for such weeds as musk thistle and marestail (i.e. horseweed), which is capable of producing a large number of seeds that are easily spread to new areas.

Clipping and Grazing Established Stands

The routine cutting of legumes for hay or mowing is sometimes effective in controlling some perennial weeds by reducing food reserves and plant vigor. Whereas, in grazed forages, livestock often selectively graze and may leave such weeds as curly dock or musk thistle. Mowing soon after livestock have been removed from the field can help control these weeds and prevent seed production and further spread of infestations. On the other hand, livestock will readily graze weeds such as johnsongrass, which can be a method to help reduce johnsongrass populations.

Herbicides for Established Stands

Several herbicide options are available for established alfalfa stands. You can use many of the same herbicides available for new seedings. Furthermore, the deep root system of established plants such as alfalfa enables them to tolerate certain herbicides that are not suitable for new seedings. When selecting herbicides for forage legumes, you should consider such factors as: whether the herbicide can be applied as a dormant season, nondormant, or between cutting treatment; and effectiveness on weed species to be controlled (Table 1 and Table 2). Feeding and grazing limitations, rotational crop restrictions, and cost of treatment should also be considered.

Scouting Methods for Forage Crops

Scouting for weed problems early is an effective tool for finding and controlling weed problems before they develop into situations that cannot be easily managed. This requires a trained eye and the ability to identify weeds in their early growth stages. Winter annual weeds, such as common chickweed and henbit, usually germinate in late fall or winter and are present in early spring, whereas, the summer weed complex, which includes crabgrass and common ragweed, will be present after the first harvest through a killing frost in the fall.

Table 1. Guide to the relative response of cool-season weeds to herbicides.[1]

Herbicide	Labeled [2] Crops (Crop Stage)	Crop Tolerance [3]	Winter Annuals									Perennials						
			Chickweed, Common	Deadnettle / Henbit	Fleabane spp.	Marestail (Horseweed)	Mustard, Wild	Pennycress, Field	Rocket, Yellow	Shepherdspurse	Thistle, Musk	Dandelion	Dock, Curly	Fescue, Tall	Orchardgrass	Plantain	Sorrel, Red (sheep)	Thistle, Canada
BEFORE SEEDING																		
glyphosate Roundup, etc	alf, cl, bf, ls	_	G	G	G	G[4]	G	G	G	G	F	F	F	G	G	F	F	F
paraquat Gramoxone, etc	alf, cl, bf, ls	_	G	G	F	F	G	F	F	G	P	P	P	F	F	P	P	N
NON DORMANT																		
2,4-DB Butyrac 200	alf(S,E), bf(S)	1	P	P	F	F	F-G	F-G	G	F	F	F	F	N	N	F	P	N
bromoxynil Maestro / Moxy	alf(S)	2	F	F	P	P	G	G	F	G	P	P	N	N	N	P	P	P
clethodim Select / Intensity	alf(S,E), bf(E)	0	N	N	N	N	N	N	N	N	N	N	N	F-G	F-G	N	N	N
Extreme / ThunderMaster	alf(S,E) [RR-alf ONLY]	1	G	F	G	G[4]	G	*	G	G	P	F	F	F	F	F	F	F
glyphosate [Roundup, etc]	alf(S,E) [RR-alf ONLY]	0	G	G	G	G[4]	G	G	G	G	F	F-G	F-G	G	G	F	F	F
imazamox [5] Raptor	alf(S,E)	1	F	F	*	P	G	G	G	F-G	P	F	F	N	N	P	P	F
Imazethapyr [5] Pursuit	alf, cl, bf (S,E)	1	G	F	*	P	G	G	G	G	P	F	F	N	N	P	P	P
sethoxydim Poast / Poast Plus	alf, cl, bf (S,E)	0	N	N	N	N	N	N	N	N	N	N	N	F	F	N	N	N
DORMANT or SEMI-DORMANT SEASON																		
metribuzin Glory / TriCor, etc	alf(E)	2	G	G	F	F	G	G	G	G	P	F	F	P	P	P	P	P
flumioxazin Chateau / Tuscany	alf(E)	3	G	G	*	F-G	F	F	F	F	P	F	N	N	N	N	P	P
DORMANT or BETWEEN CUTTINGS																		
hexazinone Velpar	alf(E)	2	G	F-G	F	F	G	G	G	G	F	F	F	F	F	F	P	P
paraquat Gramoxone, etc	alf(S,E)	2	G	G	F	P	G	F-G	F-G	G	P	P	P	F	F	F	P	N
pendimethalin Prowl H20, etc	alf(S,E)	1	F	F-G	P	N	P	P	F	F	N	N	N	N	N	N	N	N

[1] This table should be used only as a guide for comparing the relative effectiveness of herbicides to a particular weed. A herbicide may perform better or worse than indicated, depending on weed size and/or extreme weather conditions. If a farmer is getting satisfactory results under his conditions, he should not necessarily change products as a result of the information in the table.
Efficacy Ratings: G = Good; F = Fair; P = Poor; N = None; * = Data not available

[2] Labeled Crops: alf = alfalfa; cl = clover, bf = birdsfoot trefoil; ls = lespedeza; RR = Roundup Ready alfalfa varieties only;
Crop Stage: S = new seedings; E = established stands

[3] Based on a scale from 0 to 9. A crop response of 3 or less will not result in a crop yield loss when treatments are applied under normal conditions.

[4] Will not control biotypes resistant/tolerant to the class of chemistry associated with this herbicide.

[5] May also be applied between cuttings or in the fall after last cutting or in the early spring.

Table 2. Guide to the relative response of warm-season weeds to herbicides.[1]

Herbicide	Labeled [2] Crops (Crop Stage)	Crop Tolerance [3]	Summer Annuals											Perennials		
			Barnyardgrass	Crabgrass	Foxtails	Goosegrass	Cocklebur, Common	Lambsquarters, Common	Nightshade, Eastern Black	Panicum, Fall	Pigweeds/Spiny Amaranth	Ragweed, Common	Smartweed (Ladysthumb)	Johnsongrass (seedling)	Johnsongrass (rhizome)	Nutsedge, Yellow
BEFORE SEEDING																
glyphosate Roundup, etc	alf, cl, bf, ls	_	G	G	G	G	G	G	G	G	G	G	G	G	G	F-G
paraquat Gramoxone, etc	alf, cl, bf, ls	_	G	F	G	G	F	F	G	F	G	G	F	F	N	P
NON DORMANT																
2,4-DB Butyrac 200	alf(S,E), bf(S)	1	N	N	N	N	G	G	F	N	G	F-G	F-G	N	N	N
bromoxynil Maestro / Moxy	alf(S)	2	N	N	N	N	G	G	G	N	F	G	G	N	N	N
clethodim Select / Intensity	alf(S,E), bf(E)	0	G	G	G	G	N	N	N	G	N	N	N	G	G	N
Extreme / ThunderMaster	alf(S,E) [RR-alf ONLY]	1	G	G	G	G	G	G	G	G	G	G	G	G	G	F
glyphosate Roundup, etc	alf(S,E) [RR-alf ONLY]	0	G	G	G	G	G	G	G	G	G	G	G	G	G	F-G
imazamox [5] Raptor	alf(S,E)	1	G	F	G	F	G	G	G	F	G [4]	F	G	G	F	F
imazethapyr [5] Pursuit	alf, cl, bf (S,E)	1	F	F	G	F	G	F	G	F	G [4]	F-G	G	G	P	F
sethoxydim Poast / Poast Plus	alf, cl, bf (S,E)	0	G	G	G	G	N	N	N	G	N	N	N	G	F	N
DORMANT or SEMIN-DORMANT SEASON																
metribuzin Glory / TriCor, etc	alf(E)	2	F	P	F	P	P	G	F	P	G	G	F	P	N	N
flumioxazin [Chateau / Tuscany]	alf(E)	3	F	F	F	F	P	G	G	F	G	F	F	N	N	N
DORMANT or BETWEEN CUTTINGS																
hexazinone Velpar	alf(E)	2	F	F	F	P	F	G	F	F	G	F	F	N	N	N
paraquat Gramoxone, etc	alf(S,E)	2	F-G	F	G	G	F	F-G	G	G	F-G	G	F	F	N	N
pendimethalin Prowl H20, etc	alf(S,E)	1	G	G	G	G	P	G	P	G	G	P	F	F-G	N	N

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Crop Stage: S = new seedings; E = established stands

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[4] Will not control biotypes resistant/tolerant to the class of chemistry associated with this herbicide.

[5] May also be applied between cuttings or in the fall after last cutting or in the early spring.